

# ICE DAMAGE EFFECTS ON AN OLD-FIELD, THINNED AND FERTILIZED LOBLOLLY PINE STAND IN SOUTH CAROLINA

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**Abstract**—On January 26, 2004, an ice storm impacted 15 South Carolina counties. An established fertilization study area in Clarendon County, SC, was in the affected region. This old-field, thinned, loblolly pine (*Pinus taeda* L.) stand was fertilized in the spring of 1998. Treatments consisted of: (1) control; (2) poultry litter (7 tons acre<sup>-1</sup>); and (3) diammonium phosphate (DAP) (125 pounds acre<sup>-1</sup>) and urea (385 pounds acre<sup>-1</sup>). Tree ice damage was measured six growing seasons after fertilization. Total numbers of trees damaged and severity of that damage was determined for each treatment 5 weeks after the storm. Percentage of total trees damaged was not significantly different between the treatments ( $p=0.1373$ ), with a mean damage percentage of 37 percent for the control, 39 percent for poultry litter, and 45 percent for inorganic fertilizer. Percentage of severely damaged trees was also not significantly different ( $p=0.9684$ ), with means of 2.0 percent for the control, 2.0 percent for broiler litter, and 2.3 percent for inorganic fertilizer.

## INTRODUCTION

The study area was originally established to examine the effects of fertilization (poultry litter and inorganic fertilizer) on a relatively fertile old-field loblolly pine plantation. The site prior to fertilization exhibited substantial background fertility. Soil and foliage samples were collected prior to fertilization, and these tests indicated that foliar and soil nutrient levels were at or above sufficiency for loblolly pine (Allen 1987, Wells and others 1973). The addition of fertilizer materials did not significantly affect loblolly pine mean diameters, heights, basal area, or volume production on this relatively fertile old-field site 2, 4, and 6 years after treatment.

In late January, 2004, a severe winter storm impacted 15 South Carolina counties. Ice accumulation in the area persisted on the trees anywhere from an estimated 24 to 48 hours. The South Carolina Forestry Commission estimated that over 95 million dollars of damage occurred in this region. Five weeks after the storm, the study area was examined. The objectives were to determine if ice damage differences existed between treatments 6 years after fertilization.

## MATERIALS AND METHODS

The study area is located in Clarendon County, SC, in the Atlantic Coastal Plain physiographic region. The soil was mapped and verified as the Norfolk soil series (fine-loamy Typic Kandiudults). The entire plantation was thinned in January, 1998, at age 10 years from 750 trees acre<sup>-1</sup> (TPA) and 155 square feet acre<sup>-1</sup> basal area to 250 TPA and 50 square feet acre<sup>-1</sup> basal area. Treatments included: (1) control; (2) inorganic fertilizer application of 125 pounds acre<sup>-1</sup> DAP plus 385 pounds acre<sup>-1</sup> urea; and (3) poultry litter at a rate of 7 wet tons acre<sup>-1</sup>. Treatments were applied in late spring 1998. Baseline measurements were taken in 1998, and measurements were taken 2, 4 and 6 years after treatment.

Ice damage was evaluated 5 weeks after the storm. Damage was categorized as moderate or severe based on the extent of crown disturbance. A tree with three remaining live branches

or less was considered severely damaged. A tree was considered moderately damaged if more than three live branches remained, but crown damage was apparent. Total ice damage consisted of moderate and severe damage combined. A one-way analysis of variance using Duncan's multiple range test at  $\alpha = 0.05$  was used to determine statistical differences on ice damage.

## RESULTS

Ice damage was found not to be significantly different between the treatments. The percentage of total trees affected was 37 percent in the control plots, 39 percent in the poultry litter plots, and 45 percent in the inorganic fertilized plots. The percentage of total trees severely damaged was 2.0 percent for control, 2.0 percent for poultry litter, and 2.3 percent for inorganic fertilizer (fig. 1). The distribution of the damage across the diameter classes indicates that total ice damage was more pronounced on the smaller diameter classes (suppressed trees) and the larger diameter classes (dominant trees) (fig. 2).

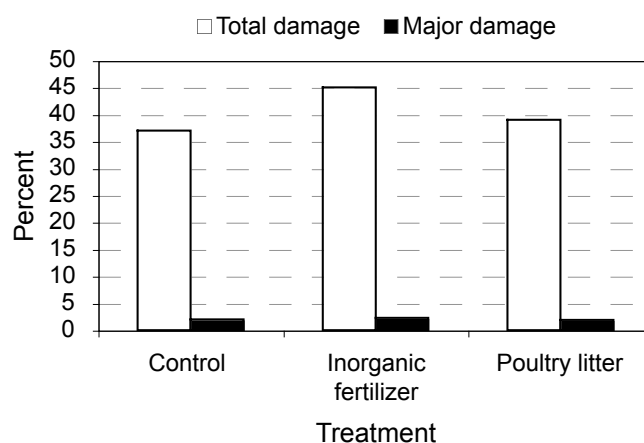


Figure 1—Total ice damage and severe ice damage as a percentage of total trees 6 years after treatment on a thinned, old-field, loblolly pine stand in Clarendon County, SC.

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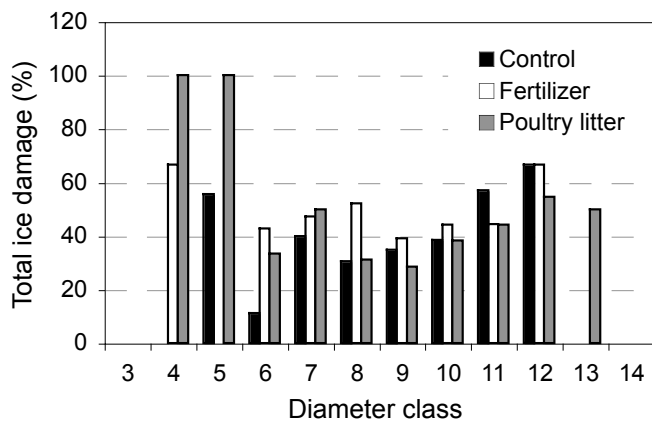


Figure 2—Total ice damage as a percent of total trees by diameter class and treatment 6 years after treatment on a thinned, old-field, loblolly pine stand in Clarendon County, SC.

Severe ice damage was more pronounced in the smaller diameter classes (fig. 3).

## DISCUSSION

The facts that this stand was planted on a relatively fertile, old-field, and the ice storm occurred 6 years after fertilization, are very important when interpreting these results. In this study, damage did not differ significantly between treatments. Ice damage on sites with different fertility conditions at the time of fertilization may be somewhat different than the damage

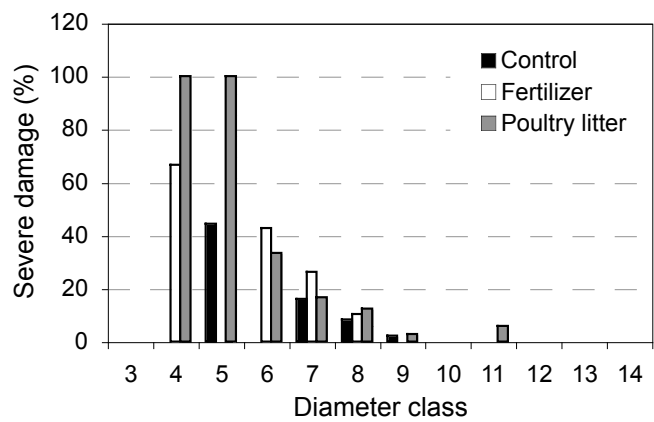


Figure 3—Severe ice damage as a percent of total trees by diameter class and treatment 6 years after treatment on a thinned, old-field, loblolly pine stand in Clarendon County, SC.

that occurred in this stand. Also, an ice storm that occurs closer to the fertilization application may have varying differences in damage.

## LITERATURE CITED

- Allen, H.L. 1987. Forest fertilizers: nutrient amendment, stand productivity, and environmental impact. *Journal of Forestry*. 85: 37-46.
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